

JC14 Rec'd PCT/PTO 03 JUL 2001

FORM PTO-1390
(REV 10-94)

U S DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

DOCKET #: 3397-98PUS

**TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING
UNDER 35 U.S.C. 371**

U.S. APPLICATION NO.

(If known, see 37 CFR 1.5).

(If known, see 37 CFR 1.5)

INTERNATIONAL APPLICATION NO.

PCT/FI00/00008

INTERNATIONAL FILING DATE

05 January 2000

PRIORITY DATE CLAIMED

05 January 1999

TITLE OF INVENTION

Method And Assembly For Supporting A Paper And Board Web In Finishing Equipment

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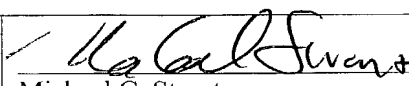
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. [x] This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371
3. [x] This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. [x] A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. [x] A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. [x] is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☐ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. [x] Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. [x] have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. [x] An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)). **Unexecuted**
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. Below concern other document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.
☒ A Letter with Proposed Drawings Changes
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☒ Other items or information (*specify*): PCT Publication, Int'l Preliminary Examination Report, PCT Request, Communication Stating Change in name of Applicant, and Demand

09/08/2001 PCT/PTO 03 JUL 2001

U.S. APPLICATION NO. (if known, see 37 CFR 1.53) 09/869752		INTERNATIONAL APPLICATION NO. PCT/FI00/00008		ATTORNEY'S DOCKET NUMBER 3397-98PUS	
17. <input checked="" type="checkbox"/> The following fees are submitted:					
Basic National Fee (37 CFR 1.492(a)(1)-(5)): Search Report has been prepared by the EPO or JPO\$860.00 International preliminary examination fee paid to USPTO (37 CFR 1.482).....\$690.00 No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)).....\$710.00 Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO\$1000.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4)\$100.00					
ENTER APPROPRIATE BASIC FEE AMOUNT =				\$	860
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$	
Claims	Number Filed	Number Extra	Rate		
Total Claims	82 - 20 =	62	x \$18.00	\$	1116
Independent Claims	2 - 3 =		x \$80.00	\$	
Multiple dependent claim(s) (if applicable)			+ \$270.00	\$	
TOTAL OF ABOVE CALCULATIONS =				\$	1976
Reduction of 1/2 for filing by small entity, if applicable.				\$	
SUBTOTAL =				\$	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$	
TOTAL NATIONAL FEE =				\$	1976
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by the appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property				\$	
TOTAL FEES ENCLOSED				\$	1976
Amount to be refunded:				\$	
charged:				\$	
a. <input checked="" type="checkbox"/> One check in the amount of \$ 1976 to cover the above fee is enclosed. b. <input type="checkbox"/> Please charge my Deposit Account No. 03-2412 in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed. c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 03-2412. A duplicate copy of this sheet is enclosed.					
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.					
SEND ALL CORRESPONDENCE TO <u>Michael C. Stuart</u> Cohen, Pontani, Lieberman & Pavane 551 Fifth Avenue, Suite 1210 New York, New York 10176			 <u>Michael C. Stuart</u> Registration Number: 35,698 Tel: (212) 687-2770		

3/PR75

09/869752
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**Method and assembly for supporting a paper and board web
in finishing equipment**

5 The invention relates to a method according to the pre-
amble of claim 1 for supporting and passing webs such as
paper and board webs in a contacting manner in a
paper/board machine in which the base web forming section
is immediately followed by web finishing devices for
immediate treatment of a web leaving the base web forming
10 section.

The invention also concerns an assembly suited for imple-
menting said method.

15 With the increasing demands on higher web speeds and
quality, well-behaved supporting and drying of a running
web are becoming increasingly important in paper and
board manufacture. Therefore, it is desirable to pass the
web in a continuously or at least partly supported manner
20 over a maximally long total distance of its travel in the
web finishing sections. The technique used for web
support also affects the drying process of the web. As
web breaks occur more easily in a wet web than in a dry
web, unsupported passages of the wet web over the
25 distance from one support member to the next, before the
wetted web is dried, represent potential points of web
breaks. If the web can be supported in a contacting
manner as long as the web is wet, the number of web
breaks can be reduced. Simultaneously, the coating of the
30 web may also be carried out at a higher moisture content
and thus in a state of weaker tensional strength than has
been possible in the prior art. As a result of processing
the web at said higher moisture content, substantial
savings can be attained in regard to both the overall
35 energy consumption and investment costs of the dryer
equipment. Further, as the specific drying capacity re-
quired in the different process steps for obtaining

application method in which the web is coated in a film-transfer coater and then passed over the backing roll to a drying cylinder. Operating in conjunction with the backing roll, there is arranged an unrestrained type of
5 dryer and from the backing roll the web is passed to a wire-supported dryer cylinder. While the wire in this embodiment is supposedly passed through the dryer cylinder section, the most critical passage with respect to web breakages, that is, the web travel within the area of
10 the applicator and the first dryer unit, is passed only supported at the support rolls. Since the web has no continuous support when it is wet and hence has the lowest strength, this kind of web supporting offers no substantial contribution to web runnability and lesser
15 number of web breaks.

It is an object of the present invention to provide a method for implementing a fully-supported travel of a web running on a wire or belt through the coating applicator
20 and also, at least partially supportedly, during subsequent drying.

The goal of the invention is achieved by passing the web to a coater station or other web treatment device in
25 which the web will be wetted and, further, to at least the first dryer located next downstream to the coater in a continuously contactingly supported manner.

According to a preferred embodiment of the invention, the
30 web is passed in a continuously contactingly supported manner from a dryer preceding a coater to a dryer located next to the coater in the downstream direction of web travel.

35 According to an embodiment of the invention, the web is passed from a dryer preceding the coater to a dryer located next to a coater in the web downstream travel

direction with the help of a single continuous support means.

5 According to an embodiment of the invention, the web is passed to at least one coater with the help of the support means of the upstream preceding web treatment device.

10 According to the most preferred embodiment of the invention, the web is passed to a coater from the upstream preceding web treatment device in a supported manner and only partially dried.

15 More specifically, the method according to the invention is characterized by what is stated in the characterizing part of claim 1.

20 Further, the assembly according to the invention is characterized by what is stated in the characterizing part of claim 32.

The invention offers significant benefits.

25 Continuous belt or wire support can effectively reduce the number of web breaks occurring in the manufacture of paper grades having a low basis weight. Additionally, the support embodiment according to the present invention based on belt-supported web travel permits the web to be passed to a coater only partially dried, because this
30 arrangement eliminates the risk of breaks in a wet web. In this context, the term partially dried web must be understood to refer to a web having a moisture content essentially higher than that of the finished end product. In this manner, the drying process of the base web and
35 its coating in the manufacture of a paper/board grade can be optimized so as to achieve a maximally high quality of the finished end product. As a result, the coating pro-

cess can be carried out at the optimum moisture content with respect to the desired qualities of the coated paper/board product, specific energy consumption and the drying requirements of the base web and its coating, as well as with respect to the investment cost of drying capacity and the overall efficiency of the manufacturing process. By contrast, in prior-art embodiments it has been mandatory to pass the base web in a rather dry state into the coater in order to avoid web breaks. In practice, this has required the moisture content of the base web leaving the papermaking machine to be substantially equal to that of the finished end product.

In the following the invention will be examined in greater detail with the help of the appended drawings in which

Fig. 1 shows diagrammatically a first coater/dryer arrangement according to the invention;

20

Fig. 2 shows diagrammatically a second coater/dryer arrangement according to the invention; and

Fig. 3 shows a preferred coater arrangement utilizing an embodiment according to the invention.

It must be noted that the term coater in the context of the present invention is used in a broad sense including also size presses and other web treatment equipment in which a material is applied to the surface of a web in a manner causing an increase of moisture content in the web.

Referring to Fig. 1, a web 1 in the arrangement illustrated therein is passed to the applicator section of a coater directly from a forming section supported by a dryer wire 2 of the papermaking machine. Obviously, the

(PTFE) or, more advantageously, a pressurized dryer cylinder is used at which air or superheated steam is blown from within the cylinder against the web thus lowering the surface pressure of the web against the cylinder or even forcing the web off from the cylinder surface into a noncontacting floating position. The cylinder 9 in the present context must be understood to refer in a general sense to any part of a dryer cylinder group. Obviously, different types of dryer cylinder elements can be used in a dryer section in lieu of the one illustrated herein when varied embodiments of the invention are to be implemented.

At this stage, the web need not necessarily be dried to its final moisture content. The dryer wire 2 of the papermaking machine is passed from the first postdryer cylinder 9 over a guide roll to the return leg of the wire back toward the direction of the papermaking machine.

The web 1 being processed now leaves the dryer wire 2 and passes onto a second wire 11 that runs over a guide roll 12 so as to transfer and support the web in the following web treatment device. Over the distance from the post-dryer cylinder 9 to the guide roll 12 of the second wire 11, the web 1 travels without support by a wire. However, the web can be passed over such a short distance unsupportedly inasmuch the web is not subjected to any stressing treatment and the web is relatively dry, whereby it is most tolerant to a possible tensional stress due to variations in web draw. This open passage of web travel can be utilized for measuring various qualities of the paper using a measurement beam sensing the sheet from both sides. However, it is also possible to pass the web if so required directly in a supported manner from the dryer wire 2 to the next dryer wire 11 using any conventional supporting means.

15

35

In Fig. 2 is shown an alternative embodiment of the

invention in which the web 1 leaving, e.g., the second coater station and its inverted roll group is passed to the next coating step and, simultaneously, the supported side of the web 1 is reversed, whereby the web is passed to run on a third wire 15. It must be noted that the web may as well be received from the wire of the papermaking machine. In the case that the wire is received from the first coater station, its both sides are already coated once, whereby the embodiment of Fig. 2 is used for applying a second coat layer. Therefore, the new layer of coating is applied in this embodiment to the first side of the web in a manner slightly different from that described above for the preceding coater stations 4, 14. Herein, the applicator roll 16 is a large-diameter cylinder having dimensions approximately equal to those of the dryer cylinders and the web wraps this cylinder 16 under the loading pressure imposed by said third wire 15. The coating is metered on the applicator roll 16 by means of an applicator apparatus 6 located under the applicator roll, whereby the coat can be transferred to the web 1 during the long dwell time of the web on the cylinder surface. The application pressure is imposed by means of said third wire 15 and if so required, the loading pressure may be increased with the help of a press roll 17 or a sliding shoe pressing the wire 15 and the underlying web 1 against the applicator roll 16. From the applicator roll 16, the web 1 passes about a guide roll 18 having a noncontacting dryer 8 adapted to cooperate therewith. Next to the noncontacting dryer is disposed a postdryer cylinder 9, wherefrom web travels over an unsupported passage to a fourth wire 18 and a fourth coater station 19. Herein, the path and coating operations of the web are equivalent to those of the first coating step carried out on the second side of the web. After the application of the second coat layer to the second side of the web, the web is dried to its final moisture content and passed to an winder or, alternatively, the

web can be passed to a calender, whereby the moisture content of the web must be controlled to a proper level for calendering.

5 To remove excess moisture from the web, the dryer cylinders may be complemented with air-impingement or suction hoods 20. The web support can be implemented with the help of various kinds of belt or wire elements. A basic requirement is that the structure and material of the elastic, continuous support element is compatible with 10 the handling of the product being manufactured. In board manufacture, the wire may even have a coarse texture, while paper grades of high basis weight require a fine-weave wire and a low-weight paper grade must be supported using an extremely fine-weave wire, support belt or even 15 a support band of substantially nonpermeable, smooth material. In principle, the lower the basis weight of the product the smoother the support element must be in order to avoid marks in the supported web. Respectively, the film-transfer roll of the applicator apparatus should 20 preferably be of a soft-surfaced type, advantageously having a hardness in the range of 20 - 100 P&J when the film-transfer technique is being used for coating application.

25 In Fig. 3 is shown an embodiment according to the invention for a fully-supported web travel through a film-transfer coater. In this arrangement, both sides of the web 1 are treated at the same coater station. This
30 embodiment is particularly suited to surface sizing, wherein the surface smoothness of support elements and cylinders are not decisive to the surface quality as in the actual coating application. The arrangement is fully free from unsupported web passages and the web is supported
35 throughout the web treatment process by a roll or a support element. Supported by the papermaking machine wire 2, the web enters the film-transfer coater from,

e.g., the dryer cylinder group of the papermaking machine over dryer cylinders 3 and turning rolls. After the last dryer cylinder, the wire 2 is arranged to pass around a cross-over roll 21. The cross-over roll 21 is wrapped by
5 a cross-over support belt or wire 22 that also runs around a turning roll 23, whereby the web 1 is picked up at the cross-over roll between the papermaking machine wire 2 and the cross-over support wire 22. At the separation point of the wires 2 and 22, the cross-over support
10 wire has been arranged to pick up the web 2 by means of a suction box adapted behind the cross-over support wire 22 or by selecting the wire materials and weave smoothnesses properly or by using a smooth transfer belt to which a dry web adheres with the help of static electricity or a
15 wet web adheres due to adhesion forces which are stronger toward a smooth-surfaced belt than a permeable wire. The use of a smooth-surfaced belt is particularly advantageous in the above-described embodiment in which the web will not be dried to its final moisture content prior to
20 its surface sizing or coating application. Furthermore, this arrangement requires less space than constructions performing web transfer from one support wire to another by means of a suction box.

25 From the support wire 2, the web is transferred to a first applicator roll 24 having a first applicator apparatus 26 adapted to cooperate therewith so as to apply a surface size, coating or other web treatment agent to the surface of the roll 24. Since the outer perimeter of the
30 applicator roll 26 is wet due to the treatment agent metered thereon, the web 1 meeting the roll 24 readily adheres to the roll surface. Next, the web adhering to the surface of the first applicator roll 24 passes into the nip formed between the applicator rolls 24, 25, wherein
35 it is transferred to wrap the surface of the second applicator roll 25. A second applicator apparatus 27 is used to apply the web treatment agent to the surface of

the second applicator roll. As the web 1 has been wrap-
 ping the perimeter of the first applicator roll by half a
 turn, it tends to continue its adherence to the roll
 surface. Hence, the surface properties of the first and
 5 the second applicator roll must be selected so that the
 web 1 has a greater preference to leave the nip by
 adhering to the surface of the second applicator roll 25.
 As the surfaces of both applicator rolls are wetted by
 the web treatment agent, the web separates more readily
 10 if the supporting surface has a coarser structure pro-
 vided by a more hydrophilic material or, alternatively,
 the surface is made harder. Toward this end, the surface
 of the second applicator roll may be surfaced with a
 smooth, hydrophobic coating such as Teflon® (PTFE),
 15 whereby the surface of the first applicator roll is
 surfaced with another material of a coarser structure,
 such as rubber.

Over the surface of the second applicator roll 25 is
 20 adapted to run a dryer group wire 11 that is passed to
 the applicator roll over a turning roll 12. At this
 stage, an air-permeable wire or felt is advantageously
 used as the web support element, since this arrangement
 permits the web 1 to be easily transferred by means a
 25 suction box 28 adapted to the point where the wire 12
 leaves the second applicator roll 25 to adhere to the
 wire 11. Next, the web passes supported by the wire 11 to
 a conventional dryer cylinder group, where the wire 11
 presses the web against the surface of the dryer cylin-
 30 ders. In surface sizing, the web 1 can be passed directly
 to the dryer cylinders 3, and both sides of the web can
 be treated in the above-described manner simultaneously.

The method taught above for transferring a web from one
 35 support element to another by virtue of utilizing the
 differences in the adherence properties of the support
 elements may be advantageously employed in the arrange-

ments illustrated in Figs. 1 and 2, as well as any other embodiments covered by the scope and spirit of the invention.

5 In addition to those described above, the present invention may have alternative embodiments.

Web moisture content in the various web treatment steps can be adjusted optimal to achieve the desired end result
10 of the coating application or web treatment process, because there is no more any need to dry the web between the treatment steps below the optimum moisture content of the process in order to achieve better runnability over the unsupported passages. As a fully supported web can be
15 handled even when wet and unsupported passages are eliminated from the travel of the wet web, the web needs drying only so much as is necessary to pass the web supportedly through the next application step and to achieve, e.g., an optimal coat surface quality, coat
20 weight or minimized specific energy consumption in drying. In this manner, the web treatment steps can be carried out at their optimal points of the papermaking process in regard to web moisture content, e.g., to manufacture a given paper grade, to eliminate web breakage
25 for some paper grade or implement an energy management system of the process or to control some other kind of process variable.

Web support can be implemented using a continuous movable
30 element which may be, e.g., a metal, polymer, glass fiber or carbon fiber belt, wire, felt or web or band. As discussed above, the surface properties of support element have a decisive role in the transfer of the web from one support element to another, which means that the permeability properties of the support element surfaces must
35 be optimized so as to eliminate all separate web tail threading or support means from the web transfer and

threading system. The selection of the suitable support element type is also dependent on the dryer equipment used, whereby air-impingement and suction dryers conventionally require a gas-permeable support element for
5 proper function, while infrared dryers and the like need the support element to be only resistant to the heat load imposed by the dryer.

The web support method according to the invention may
10 also be used in combination with noncontacting web support arrangements so that the web is passed supported by air jets to a section utilizing the support system according to the invention or, respectively, is passed from the process line section utilizing the support
15 system according to the invention to the next downstream located web treatment section, where the web is guided by means of an air-jet support system. The number of dryer cylinders before and after the web treatment section discussed herein may be varied as needed and the desired
20 sections of the web processing line may be implemented using two-wire support in which the web is supported from both sides.

The web support elements may be grouped in many different
25 fashions. In addition to those described above, the web may be guided so that a single continuous support element is used to pass the web from the first web treatment device all the way down to the next web treatment device. The application nip or area may be formed by pressing the
30 support belt either directly against the web by means of the belt-tensioning force or by augmenting the loading pressure with a separate press roll or sliding shoe. When the web is passed from one support element to another, it can be passed via wire/web spreading means.

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Although the metering of the coating film in the above-described embodiments illustrating the use of a film-

What is claimed is:

1. Method for supporting a web (1) during the post-processing of a web of paper or board, the method comprising the steps of:

- passing the web from a preceding section to at least one next downstream located web treatment section (4) wherein to at least one side of the web (1) is applied a treatment agent causing wetting of said side of said web, and

- passing the web (1) exiting said web treatment section to at least one dryer apparatus (8),

15

c h a r a c t e r i z e d in that

- supporting the web (1) contactingly in a continuous and unbroken manner at least from said web treatment section (4) to said dryer (8).

20

2. Method according to claim 1, c h a r a c t e r - i z e d by comprising the steps of

- drying the web (1) with at least one drying apparatus (3) prior to passing the web to said web treatment section (4), and

25

- contactingly supporting the web in a continuous and unbroken manner at least from said drying apparatus (3) preceding said web treatment section (4) to said dryer apparatus (8) located downstream next to said web treatment section.

30

3. Method according to claim 2, c h a r a c t e r - i z e d in that the web (1) is supported by means of a dryer wire (2) of a paper- or board making machine.

35

4. Method according to claim 2 or 3, c h a r a c -
t e r i z e d in that the web is passed supported by a
continuous support element (2) at least from a drying
5 apparatus (3) preceding said web treatment section (4) to
the drying apparatus (8) located downstream next to said
web treatment section.

5. Method according to claim 2, c h a r a c t e r -
10 i z e d in that the web (1) is passed to at least one
downstream located web treatment section (4) supported by
the continuous support element of the upstream preceding
web treatment section.

15 6. Method according to claim 1, c h a r a c t e r -
i z e d in that the web (1) is passed supportedly and
only partially dried from an upstream preceding web
treatment section to the next downstream located web
treatment section.

20 7. Method according to claim 4, c h a r a c t e r -
i z e d in that the web (1) is supported by one and the
same support element (2) through said web treatment
section (4) and during the entire web travel through the
25 next downstream located drying apparatus (8).

8. Method according to claim 1, c h a r a c t e r -
i z e d in that the web (1) is supportedly passed from
the upstream preceding, web-wetting treatment section to
30 the next downstream located web treatment section and the
web is dried so that at least a portion of the moisture
content of the web is evaporated.

9. Method according to claim 6, c h a r a c t e r -
35 i z e d in that the web (1) is passed to said web treat-
ment section in a condition optimized with respect to the
requirements of the paper grade being manufactured, the

investment costs, the frequency of web breakages, the overall energy consumption of the process, desired paper quality or the like target variable.

- 5 10. Method according to claim 1, c h a r a c t e r -
i z e d in that the web is supported by means of a
support element against a member of the web treatment
apparatus, advantageously a film-transfer roll or blade
coater, that serves to apply a web-wetting agent to the
10 surface of the web.
11. Method according to claim 1, c h a r a c t e r -
i z e d in that the web is dried by a microwave dryer,
air-impingement dryer, contacting dryer, suction dryer or
15 the like dryer means, wherein the web is supported by a
member of a material suitable for resisting the impact of
said drying apparatus.
12. Method according to claim 1 or 11, c h a r a c -
20 t e r i z e d in that the web is supported by means of a
belt or surfaced belt or fabric that is impermeable to
moisture.
13. Method according to claim 1 or 11, c h a r a c -
25 t e r i z e d in that the web is supported by means of a
wire, fabric, porous felt or porous or perforated belt
that is permeable or absorbent to a liquid or gaseous
medium.
14. Method according to claim 1, c h a r a c t e r -
30 i z e d in that at least one surface of the web is
coated with a coating which is transferred with the help
of a movable member passing through an application nip or
area.
- 35 15. Method according to claim 14, c h a r a c t e r -
i z e d in that said application nip or area is formed

by a loading element such as a roll, belt or sliding shoe.

16. Method according to claim 1, c h a r a c t e r -
 5 i z e d in that the web is supported in the first web
 treatment section by air-jet support means, after which
 the web is passed onto a contacting support element for
 spreading the web, subjecting the same to measurement of
 process qualities or supportingly passing the web to
 10 subsequent web treatment sections.

17. Method according to claim 1, c h a r a c t e r -
 i z e d in that the web is supported by a plurality of
 successive support elements and the web (1) is trans-
 15 ferred supportedly or guided by web guidance means (10)
 from one support element (2) to the next support element
 (11) in the succession.

18. Method according to claim 1 or 17, c h a r a c -
 20 t e r i z e d in that the web is passed from one support
 element to the next via web spreading or tension-
 controlling means.

19. Method according to claim 1 or 15, c h a r a c -
 25 t e r i z e d in that the web (1) is pressed against the
 surface of at least one roll serving to form a nip and
 apply a coating.

20. Method according to claim 1 or 15, c h a r a c -
 30 t e r i z e d in that the web (1) is pressed against the
 surface of at least one sliding shoe element serving to
 form a nip and allowing a coat-applying planar element to
 slide thereon.

21. Method according to claim 1, c h a r a c t e r -
 35 i z e d in that a first side of the web is supported by
 a movable continuous support element, while a coating is

more hydrophilic than the surface of the receiving support element.

26. Method according to claim 24, c h a r a c t e r -
5 i z e d in that the web is supported by elements in which the surface of the delivering support element is softer than the surface of the receiving support element.

27. Method according to claim 24, c h a r a c t e r -
10 i z e d in that the web is supported by elements in which the surface of the delivering support element (24) has a coarser texture than the surface of the receiving support element (25).

15 28. Method according to claim 24, 25, 26 or 27, in which method the web treatment device is a film-transfer coater, c h a r a c t e r i z e d by comprising the steps of

20 - passing the web (1) transferred on the support wire (2) of the dryer to a first support element (22),

- passing the web (1) from said first support element (22) onto the surface of a first film-transfer appli-
25 cator roll (24),

- passing the web supported by the outer circumferen-
tial surface of said first film-transfer applicator
roll (24) onto a second film-transfer applicator roll
30 (25), and

- passing the web supported by the outer circumferen-
tial surface of said second film-transfer applicator
roll (25) onto a next downstream located contacting
35 support element (11).

29. Method according to claim 1 or 24, c h a r a c -

t e r i z e d in that the web is supported by means of a movable element that can be, e.g., a metal, polymer, glass fiber or carbon fiber belt, wire, felt or web or band.

5

30. Method according to claim 1, 15 or 24, c h a r -
a c t e r i z e d in that the web is supported in the
film-transfer coater by means of a support belt that
serves to transfer a web treatment agent to the surface
10 of the web.

31. Assembly for supportedly guiding a web (1) during
the postprocessing of a web of paper or board, said
assembly comprising

15

- at least one web treatment device (4),
- at least one device (3) preceding said web
treatment device,

20

- elements (2) for passing the web (1) from said
preceding device (3) to at least one next downstream
located web treatment device (4) suited for applying
to at least one surface of the web (1) a treatment
agent that wets the web, and

25

- elements for passing the web (1) to at least one
dryer (8) following said web treatment device,

30

c h a r a c t e r i z e d by

- at least one support element (2) for passing the
web (1) in a continuous and unbroken manner at least
from said web treatment device to said next down-
stream located dryer.

35

32. Assembly according to claim 31, c h a r a c t e r -

i z e d by

- at least one dryer (3) for drying the web prior to passing the web to said web treatment device (4), and

5

- a support element for contactingly supporting the web (1) in a continuous and unbroken manner at least from said dryer (3) preceding said web treatment device (4) to said dryer (8) located downstream next to said web treatment device.

10

33. Assembly according to claim 31, c h a r a c t e r - i z e d in that said element for passing the web (1) is a dryer wire (2) of a paper or boardmaking machine.

15

34. Assembly according to claim 31, c h a r a c t e r - i z e d by a single continuous support element (2) being used for passing the web in a supported manner at least from said dryer (3) preceding said web treatment device (4) to said dryer (8) located downstream next to said web treatment device.

20

35. Assembly according to claim 31, c h a r a c t e r - i z e d by a single continuous support element being used for passing the web (1) to at least one next downstream web treatment device from an upstream preceding web treatment device.

25

36. Assembly according to claim 35, c h a r a c t e r - i z e d by one and the same support element (2) being used for supporting the web (1) through said web treatment device (4) and during the entire web travel through the next downstream located dryer (8).

30

37. Assembly according to claim 31, c h a r a c t e r - i z e d by having at least one support element adapted to support the web (1) so as press the web against a

35

member of the web treatment section, advantageously a film-transfer roll or blade coater, that serves to apply a web-wetting agent to the surface of the web.

5 38. Assembly according to claim 31, c h a r a c t e r -
i z e d by at least one microwave dryer, air-impingement
dryer, contacting dryer, suction dryer or the like dryer
apparatus, wherein the web is supported by a member of a
material suitable for resisting the impact of said dryer.

10

39. Assembly according to claim 31 or 38, c h a r a c -
t e r i z e d in that said support element is a belt or
surfaced belt/fabric that is impermeable to moisture.

15

40. Assembly according to claim 31 or 38, c h a r a c -
t e r i z e d in that said support member is a fabric,
porous felt or porous/perforated belt that is permeable
or absorbent to a liquid or gaseous medium.

20

41. Assembly according to claim 31, c h a r a c t e r -
i z e d by at least one movable element capable of
defining at least one application nip or area in which
nip or area at least one surface of the web is coated
with a coating transferred with the help of said movable
25 member passing through said application nip or area.

30

42. Assembly according to claim 41, c h a r a c t e r -
i z e d by having said application nip or area defined
with the help of a loading element such as a roll, belt
or sliding shoe.

35

43. Assembly according to claim 31, c h a r a c t e r -
i z e d by a plurality of successive support elements
serving to support the web and to transfer the web (1)
supportedly or guided by web guidance means (10) from one
support element (2) to the next support element (11) in
the succession.

44. Assembly according to claim 31, c h a r a c t e r -
i z e d by means for supportedly pressing a first side
of the web against a movable continuous support element
5 and means for applying a coating to the second side of
the web using, e.g., a spray-coating method, a jet-
coating method, a blade/rod coater or an applicator roll
coater.
- 10 45. Assembly according to claim 31 or 44, c h a r a c -
t e r i z e d by air-impingement or suction means for
adhering the web to the support element.
- 15 46. Assembly according to claim 31, c h a r a c t e r -
i z e d in that the surface of the support element is
patterned with a desired surface texture serving to make
a desired surface or base coating pattern on the web side
to be treated.
- 20 47. Assembly according to claim 31, c h a r a c t e r -
i z e d by a succession of support elements (2, 22, 24,
25, 11) serving to support the web, said support elements
having their surface qualities so selected as to make the
adherence of the web at the cross-over point of said sup-
25 port elements stronger to the downstream next, receiving
support element than to the upstream preceding, deliver-
ing support element.
- 30 48. Assembly according to claim 47, c h a r a c t e r -
i z e d in that the surface of the delivering element is
more hydrophilic than the surface of the receiving
element.
- 35 49. Assembly according to claim 47, c h a r a c t e r -
i z e d in that the surface of the delivering element
(24) has a coarser texture than that of the surface of
the receiving element (25).

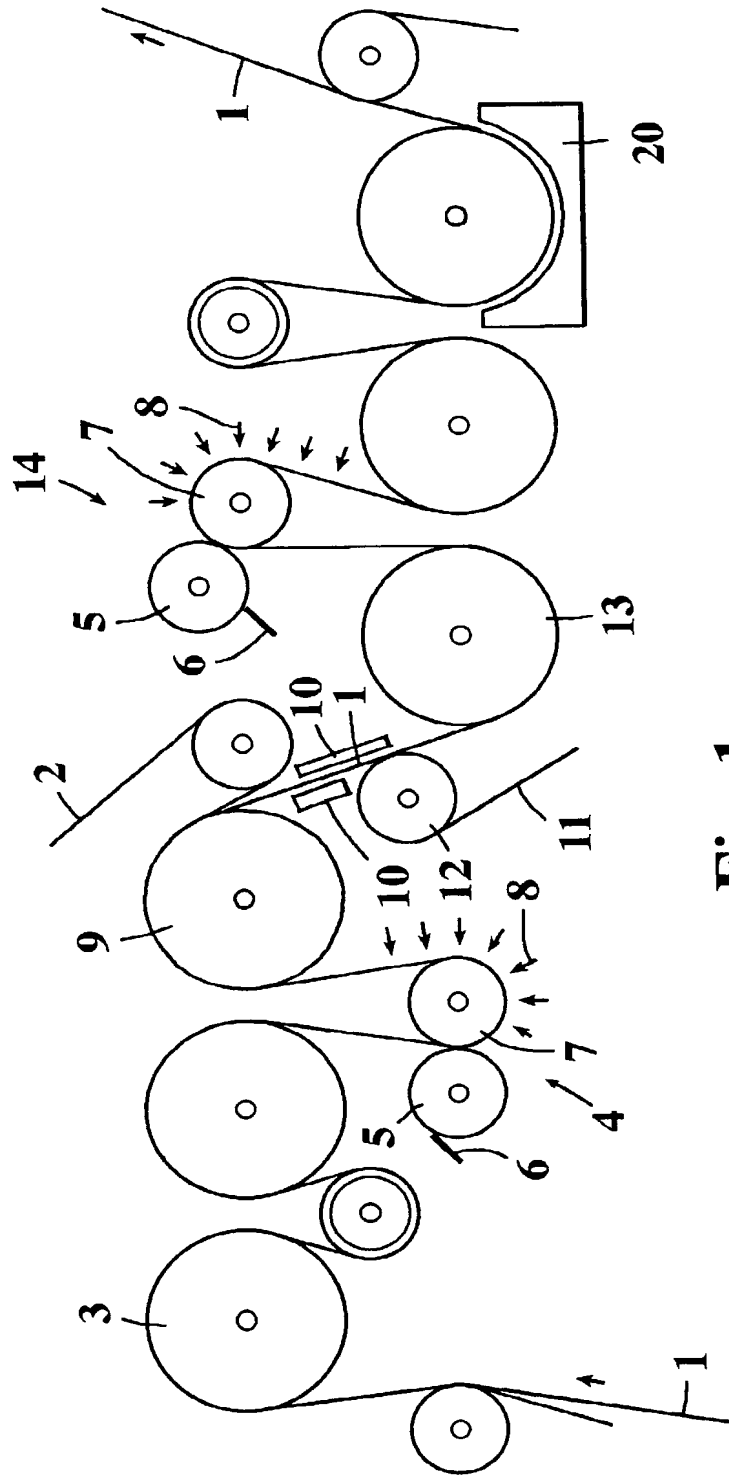


Fig. 1

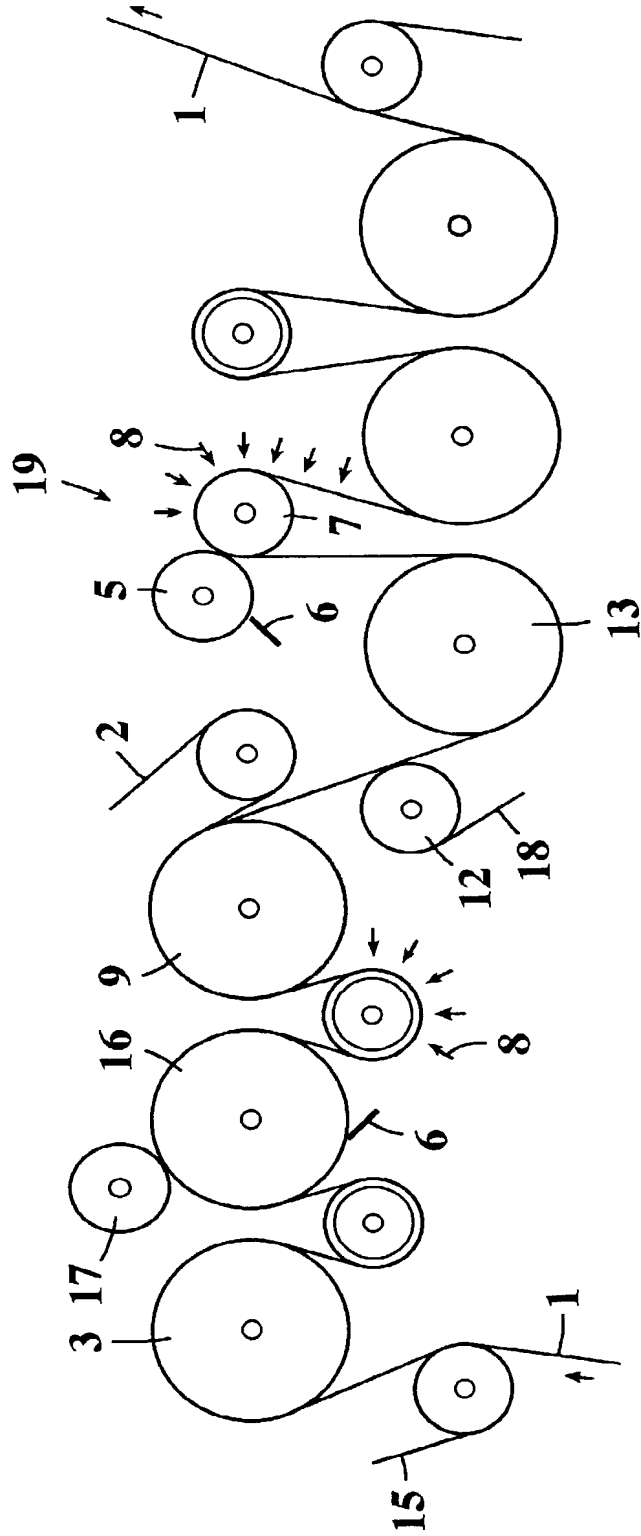


Fig. 2

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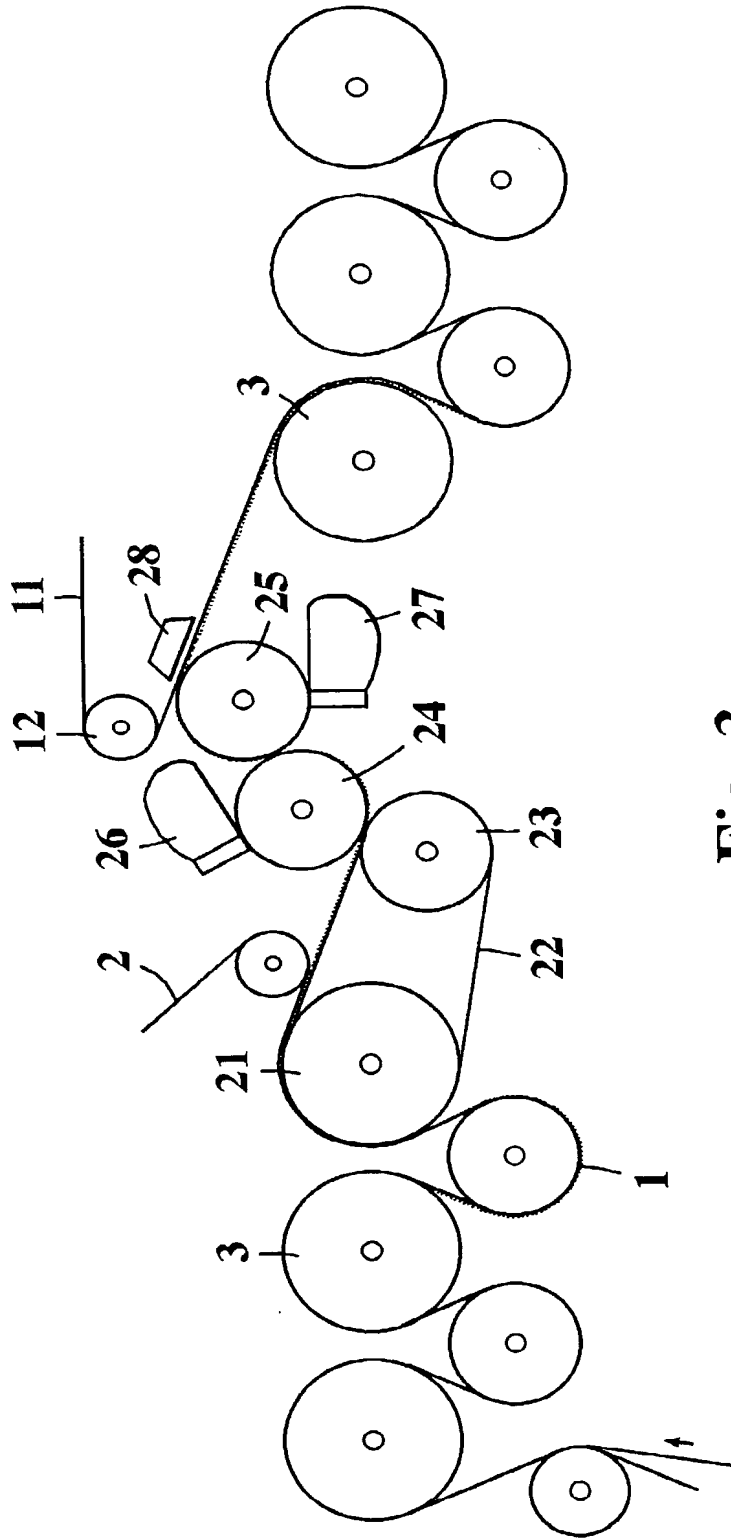


Fig. 3

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COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY
Includes Reference to PCT International Applications

Attorney's Docket No. _____

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: Method and assembly for supporting a paper and board web in finishing equipment

the specification of which (check only one item below)

☐ is attached hereto

☐ was filed as United States application

Serial No. _____

on _____

and was amended

on _____ (if applicable).

☒ was filed as PCT international application

Number PCT/FI00/00008

on January 5, 2000

and was amended under PCT Article 19

on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of the application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

PRIOR FOREIGN/PCT APPLICATIONS AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. 119:

Country (if PCT, indicate "PCT")	Application Number	Date of Filing (day, month, year)	Priority Claimed Under 35 U.S.C. 119	
Finland	990008	5 January 1999	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PCT	PCT/FI00/00008	5 January 2000	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
			<input type="checkbox"/> YES	<input type="checkbox"/> NO
			<input type="checkbox"/> YES	<input type="checkbox"/> NO
			<input type="checkbox"/> YES	<input type="checkbox"/> NO

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY

Attorney's Docket No.

(Continued)

Includes Reference to PCT International Applications

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application:

PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT UNDER 35 U.S.C. 120:

U.S. APPLICATIONS			STATUS (check one)		
U.S. APPLICATION NUMBER	U.S. FILING DATE		PATENTED	PENDING	ABANDONED
PCT APPLICATIONS DESIGNATING THE U.S.					
PCT APPLICATION NO.	PCT FILING DATE	U.S. SERIAL NUMBERS ASSIGNED (if any)			
PCT/FI00/00008	5 January 2000				

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith (*List name and registration number*)

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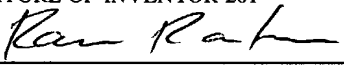
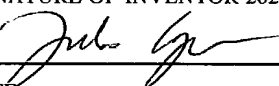
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Combined Declaration for Patent Application and Power of Attorney (Continued) (Includes Reference to PCT International Applications)				Attorney's Docket No.
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Combined Declaration for Patent Application and Power of Attorney (Continued) (Includes Reference to PCT International Applications)				Attorney's Docket No.
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	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY
2 1 1	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME
	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP
	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY
2 1 2	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME
	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP
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<p>I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.</p>				
SIGNATURE OF INVENTOR 201 		SIGNATURE OF INVENTOR 202 		SIGNATURE OF INVENTOR 203
DATE July 23, 2001		DATE July 23, 2001		DATE
SIGNATURE OF INVENTOR 204		SIGNATURE OF INVENTOR 205		SIGNATURE OF INVENTOR 206
DATE		DATE		DATE
SIGNATURE OF INVENTOR 207		SIGNATURE OF INVENTOR 208		SIGNATURE OF INVENTOR 209
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